

# Status of the Universe “Legacy” Roadmap

A Merger of the **Origins** and **SEUS/Beyond Einstein** Programs

Adam Burrows  
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# Roadmapping Efforts

- “Bottoms up” roadmapping was formerly through SEUS & OS roadmaps. This year, it will be a single **“Universe” roadmap**. This is the **“Legacy” roadmap**, and will be an **input for two Strategic Roadmaps**. Co-chairs of Universe legacy roadmap are Adam Burrows and Kathryn Flanagan.
- Strategic Roadmaps (SRM) are “top down” roadmaps.
  - SRM 4 “Search for Earth-like planets”** (Co-chairs are Ghassem Asrar, Chas Beichman and Adam Burrows)
  - SRM 8 “Universe Exploration”** (Co-chairs are Anne Kinney, Nick White and Kathryn Flanagan)
- There are also capabilities roadmaps.

# Search for Earth-like Planets Strategic Roadmap Committee

## Committee Members

**Ghassem Asrar, Science Mission Directorate, *co-chair***

**Charles Beichman, Jet Propulsion Laboratory, *co-chair***

**Adam Burrows, University of Arizona, *co-chair***

Jerry Chodil, Ball Aerospace (retired)

Tom Greene, Ames Research Center

Maureen Heath, Northrop Grumman Space Technology

John Mather, Goddard Space Flight Center

Victoria Meadows, Jet Propulsion Laboratory

Geoff Marcy, University of California

Frank Martin, Lockheed Martin (retired)

David Spergel, Princeton University

Neil Tyson, American Museum of Natural History

Alycia Weinberger, Observatories of the Carnegie Institution of Washington

**Eric P. Smith, Mission Directorate Coordinator, *Designated Federal Official***

Rich Capps, Advanced Planning and Integration Office Coordinator (JPL)

## Ex Officio and Liaison

Mike Devirian, Jet Propulsion Laboratory

Edna Devore, SETI, liaison to the Education Strategic Roadmap Committee

Anne Kinney, Science Mission Directorate

## Staff

Gary Blackwood, Systems Engineer, Jet Propulsion Laboratory

# Universe Exploration Strategic Roadmap Committee

## Committee Members

**Anne Kinney**, NASA Science Mission Directorate, *co-chair*

**Nick White**, Goddard Space Flight Center, *co-chair*

**Kathy Flanagan**, Massachusetts Institute of Technology, *co-chair*

Chuck Bennett, Goddard Space Flight Center

Craig Hogan, University of Washington

Steve Kahn, Stanford University, Stanford Linear Accelerator Center

Rene Ong, University of California, Los Angeles

Sterl Phinney, California Institute of Technology

Ron Polidan, Northrop Grumman Space Technology

Michael Shull, University of Colorado

Bob Stern, Lockheed Martin

Michael Turner, National Science Foundation

Jakob van Zyl, Jet Propulsion Laboratory

**Michael Salamon**, Mission Directorate Coordinator, *Designated Federal Official*

Rich Capps, Advanced Planning and Integration Office Coordinator (JPL)

## Ex Officio and Liaison

Louis Barbier, Goddard Space Flight Center

Roy Gould, Harvard Center for Astrophysics, Education Roadmap Committee Liaison

Steve Maran, American Astronomical Society, community and media liaison

## Staff

Gary Blackwood, Systems Engineer, Jet Propulsion Laboratory

## **Key community inputs to subcommittees and SRMs**

### **▪Origins 2003 and Beyond Einstein Documents**

#### **▪To SRMS:**

NASA APIO RFI GC-04-06

Nov 2, 2004

Request for white papers from community to SRMs and CRMs. Closed and white papers available.

#### **▪To subcommittees:**

SEUS/OS meeting with presentations by “Vision Missions” -

Nov 2004

Selected White Paper authors presented at special HEAD session at AAS Jan 2005

Presentations by Origins Probes

Jan 14, 2005

Additional white papers solicited for Universe Roadmap due in Feb.

# Universe Legacy Roadmap Team

## **“Origins (OS)”**

*Adam Burrows*

*Jim Breckinridge\**

*Vicki Meadows*

*George Rieke\**

*David Weinberg\**

*Michael Devirian\**

*William Greene*

*Eric Smith\*\**

*Chas Beichman*

*Sally Heap*

*Alycia Weinberger*

*Wes Traub*

*James Green*

*Mike Hauser*

*Michael Meyer*

*David Spergel*

*Steve Unwin*

*Harry Ferguson*

*Tom Greene*

*Andrew Blain*

*Geoff Blake*

*Mike Shara*

## **“Structure and Evolution of the Universe (SEU)”**

*Kathryn Flanagan*

*Mike Cherry*

*Craig Hogan*

*Sam Finn*

*Jack Hughes*

*Jim Ulvestad*

*Jamie Bock*

*Stephen Murray\**

*Nick White*

*Jean Swank*

*Hal Yorke*

*Joel Bregman*

*Lee Mundy*

*Roy Gould\**

*Sarah Church\**

*Dan Lester\**

*Rocky Kolb*

*Brenda Dingus*

*Ned Wright*

*Louis Barbier\**

*Tim Heckman*

*Tom Murphy\**

*Michael Salamon\*\**

\*external roadmap member    \*\* executive secretary

# Outline of Universe Roadmap

Executive Summary

Overview

Beyond Einstein: Exploring the Extremes of Spacetime

The Origin and Evolution of Cosmic Structure

**The Secret Lives of Stars**

**Planetary Systems and the Search for Habitable Worlds**

**Mission Summary**

**Enabling Technology**

Sustaining the Vision

Education and Public Outreach

Appendix: Objectives/RFAs

Back Material: Acronyms, glossary, sources of further  
information, external factors, contributors

# Secret Lives of Stars

- Trace the path from interstellar clouds of gas and dusts to stars
- Explore the exotic objects left by dying stars, and the creation of the heavy elements essential for planets and life
- Conclusion



# The Search for Habitable Planets and Life Beyond the Solar System

- Study the formation and Evolution of Planetary Systems
- The Quest for planets: Exploring the Architecture and Nature of Planetary Systems
- Characterizing Extrasolar Giant Planets
- Characterizing Terrestrial Planets

# Strategic Mission Summary

- Implementation Philosophy
- Navigator Program: Exploring New Worlds
- Beyond Einstein: The Program

# Technology Enables Discovery

- Technology is central to NASA Space Science
- Capabilities for the future
- Implementation Strategy
- Strategic Technologies
- The Space Technology Community
- Technology Success Story Sidebars

# Sustaining the Vision

- Research and Analysis
- Training the Next Generation
- Technology Incubation
- Theoretical Research
- Laboratory Astrophysics
- Archival Research
- The Explorer Program
- The Suborbital Program

# Status of Universe Roadmap

- First draft will soon be available to team (relevant individual chapters)
- Universe subcommittee has not yet met and fully validated the draft.
- In particular, the inclusion and prioritization of “Vision Missions” and Origins Probes must be discussed. Universe subcommittee expects to meet in March.